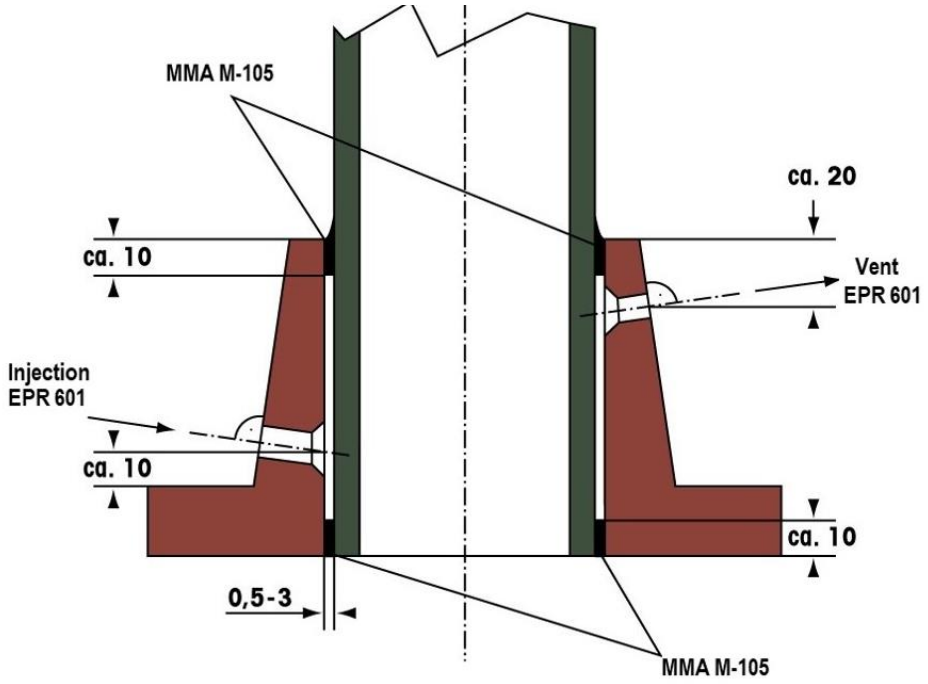
Note!
This system is suitable to be used with Fixed Flanges and Stub Flanges Type A only.

Rotec Injection Adhesive Bonding System



Location of drillings for gluing flanges

Rotec Injection Adhesive System (R.I.A.S.) for a reliable, safe and clean assembly of Rotec Fixed Flanges and Stub Flanges Type A.

Rotec recommends its adhesives and the adhesive injection system (R.I.A.S.) for bonding Rotec Fixed Flanges and Stub Flanges Type A (inside cylindrical) to composite pipes. Rotec adhesives give excellent results, are easy to use, have consistent performance and require limited times to bond. R.I.A.S. is ensuring a high quality bonding without any air pockets and minimum waste of material.

The two component adhesive systems with 1:1 mixing ratios are packed in “coaxial double cartridges” with 600 ml (EPR 601) and 400 ml (M 105) capacity. The cartridges have two separate cylinders in order to keep the two components seperated. By using a pneumatic injection gun, the two components are forced out of the cartridge in the correct proportions and are subsequently homogeneous mixed by the static mixer. Attention should be paid to obtain a sufficiently high output, otherwise full mixing of the two components will not be achieved and the adhesive will not properly cure.

Adhesives

M-105, *METHYL METH ACRYLATE*

A corrosion resistant 2-component Methacrylate adhesive/paste with high resistance to moisture and chemicals. It has a high viscosity and very short curing time.

EPR601, *EPOXY ADHESIVE*

A corrosion resistant 2-component Epoxy adhesive with high resistance to moisture and chemicals. It has a low viscosity and a long potlife (curing slowly).

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Rotec flange bonding by two component adhesive injection system

R.I.A.S. requires the use of both types of adhesive for applying flanges to pipe. The M-105 adhesive is used to seal (close) the gap between pipe and flange at both sides (front and back), and the EPR 601 EPOXY adhesive, which ensures the long term bond strength, is then injected into the enclosed chamber between flange and pipe.

Resistance to chemicals

The environmental conditions to which the adhesive is exposed may be the main factor concerning an eventual deterioration of the performance of the adhesive. The effect of chemical attack may be detrimental to the long term bond strength. For this reason it is very important to select the right type of adhesive to be used and check its suitability. It is at user's decission and responsibility to use this or any other adhesive.

After full curing, the M-105 adhesive/paste is having a good, long term resistance to water, sea water and very diluted acids and alkalis. Any exposure to concentrated acids or alkalis must be very limited as to the duration of exposure. The resistance to detergents, hydrocarbons, mineral oils, chlorinated solvents and strongly oxidizing acids such as nitric or sulfuric acids is very low when exposed permanently.

Bonding Rotec flanges

1 The bonding surface of the pipe should be calibrated and grinded or sand blasted. Both surfaces (flange and pipe) should be free of moisture, dust and grease. Drill an injection hole, diameter 7.0 mm, and a venting hole, diameter 7.0 mm in the flange as shown on the above drawing. Countersink the injection and venting holes on the inside of the flange to assure better flow.

2 Position the pipe and then shift the flange over the pipe into position. Secure both in such a manner that the gap between pipe and flange (between 0.5 and 3.0 mm depending upon the diameter) is uniformly distributed over the full circumference. The pipe and flange can be bonded either in vertical and horizontal position. In both cases the adhesive should be injected in the lower position, with the aeration hole on the upper side.

3 VITAL STEP! Apply the M-105 with the adhesive gun and a static mixer, close/seal both gaps with air tight seals by applying the M-105 in the gap. Within 2 minutes, smoothen out the adhesive (with index finger) so that the adhesive is pushed into the gap to a depth of approximately 1 cm.

Important considerations:

- Adhesives (cartridge) tempature must be between 15°C and 25°C.
- Be sure to inject the adhesive INTO the gap (not on top only).
- If the procedure is interrupted, this might result in leakage at the point of interruption. Make sure this doesn't happen.
- Each time a new adhesive cartridge is used, discard the initial amount of adhesive extruded. Use the adhesive once the components have been homogeneously mixed and no air is entrapped in the mix.
- Curing at 20°C will take about 15 minutes.
- Check to make certain that the adhesive seals are closed and properly cured.
- Place a 25 cm length of 8mm diameter tubing in the venting hole.

4 Once the M-105 adhesive/paste has cured completely, inject the EPR601 EPOXY adhesive, using the adhesive gun and a NEW static mixer. Push the outflow opening of the static mixer into the injection hole and start injection. As for the M-105 adhesive do not use the initial portion of adhesive from a new adhesive cartridge. Always take care that the venting is adequate and that the air pressure for the pneumatic gun is sufficient (6 bar min.). When the adhesive starts coming out of the venting tube, maintain the pressure for some time and continue the injection process until no more air escapes from the venting tube (the time required varies with the diameter). The pressure during this process is approximately 5 bar, so always use safety glasses!

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Attention:

- When bonding large diameter flanges (above 1000 mm diameter) drill 3 vent holes at a distance of 30 cms from each other for checking and controlling the flow.
- If the gap between flange and pipe is less than 2 mm, shamfer the end of the pipe (approx 3 mm shamfer) at an angle of 45° in order that a wider gap is created.
- If the flange and/or the pipe is cold (< 15°C) first heat them to over +15°C.
- If the adhesive is cold (< 15°C) first bring the required quantity of adhesive to a temperature above 20°C preferably around 25°C, by placing it in warm water or oven.
- At lower temperatures (< 15°C) the viscosity of Epoxy adhesive in particular can increase significantly, becoming unsuitable for injection, this needs to be prevented at all times.
- At higher temperatures, the pot life (curing time) will decrease. If pot life is not sufficient, injection of the full gap won't be achieved.

5 Remove the static mixer from the injection hole and quickly and completely close/seal this hole (with, for example, an M8 bolt or a wooden plug). Close the vent hole or holes by kinking the tubes and securing them with tape (do not remove the tubes).
All excessive adhesive must be removed from the outside of the flange within thirty minutes as it is extremely difficult to remove once it has cured. Heating is not necessary as the adhesive will be fully cured after 72 hrs without heating.
The period of time possible to work with the adhesive after mixing (open time) is approximately 75 minutes at 20°C. Further information concerning service life against temperature is included in the data in each box of adhesive.
The minimum temperature for application is 15°C.

6 Clean the flange surfaces.

7 Bonding is now completed.

Caution

WHEN WORKING WITH ADHESIVES AND/OR RESINS ALWAYS FOLLOW THE RECCOMENDATIONS PROVIDED IN THE SAFETY INFORMATION SHEETS!
ALWAYS WEAR SAFETY GLASSES AND GLOVES!

Handling and storage

Keep the product in a tightly sealed package. Avoid contact with skin and eyes. After any skin contact wash thoroughly with soap and water. In case of contact with eyes, rinse immediately with copious amounts for 15 minutes whilst at the same time seeking medical advice. Keep out of reach of children, and keep away from heat, ignition devices, sparks and open flames.

Mixing and application

The preferred method of application for M-105 and EPR601 is with the aid of a pneumatic adhesive gun and a static mixing tube. To assure maximum bond strength, the adhesive should be applied within the indicated time (assembly time)

Use sufficient material as required to insure that the adhesive seam is completely filled by the M-105. Any moving of the bonded parts after the assembly time has elapsed and before the fixation time has been achieved can result in reduced bonding strength.
Avoid adhesive film (gap between the pipe and the flange) thickness exceeding 4 mm.

Storage and storage life

Keep in a cool dry place. The M-105 adhesive can be kept for a maximum of 12 months if stored in the original unopened package at a temperature of 15°C. Max. The epoxy adhesive can be kept for a maximum of 24 months if stored in the original unopened package at a temperature of 15°C. Max.

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Important

Use a “first in - first out” system in order that the oldest material will always be used first.

Supply and properties of the adhesives and associated tools

Using R.I.A.S., two adhesive materials are required for each bonded connection. Please see below for detailed information concerning both adhesive systems by Rotec.

The material proposed by Rotec can be summarized as follows:

Article	Article number
Methyl Meth Acrylate adhesive 400 ml in 1:1 co-axial cartridge	M-105
Manual adhesive gun for M-105 or	APA400M
Pneumatic adhesive gun for M-105	APA480
Epoxy adhesive 600 ml in 1:1 co-axial cartridge	EPR601
Pneumatic adhesive gun	APA680

The quantities of adhesives required per joint varies with the diameter and pressure rating of the flange. Based upon an average gap of 2.0 mm between the pipe and the flange the number of cartridges per joint can be estimated as follows.

Flange Identification	MMA cartridges M-105 (no./ product)	Epoxy cartridges EPR601 (no./ product)	Flange Identification	MMA cartridges M-105 (no./ product)	Epoxy cartridges EPR601 (no./ product)
SF/FF-150-10	0,20	0,30	SF/FF-800-3	0,90	3,00
SF/FF-150-16	0,20	0,40	SF/FF-800-10	0,90	3,50
SF/FF-200-10	0,25	0,50	SF/FF-800-16	0,90	4,00
SF/FF-200-16	0,25	0,60	SF/FF-900-3	1,00	3,30
SF/FF-250-10	0,30	0,60	SF/FF-900-6	1,00	3,80
SF/FF-250-16	0,30	0,70	SF/FF-900-10	1,00	4,40
SF/FF-300-10	0,35	0,70	SF/FF-1000-3	1,10	3,80
SF/FF-300-16	0,35	0,80	SF/FF-1000-6	1,10	4,60
SF/FF-350-10	0,40	0,90	SF/FF-1000-10	1,10	5,40
SF/FF-350-16	0,40	1,10	SF/FF-1100-3	1,20	4,00
SF/FF-400-10	0,45	1,20	SF/FF-1100-6	1,20	5,00
SF/FF-400-16	0,45	1,40	SF/FF-1100-10	1,20	6,00
SF/FF-450-10	0,50	1,50	SF/FF-1200-3	1,30	4,30
SF/FF-450-16	0,50	1,70	SF/FF-1200-6	1,30	5,40
SF/FF-500-3	0,60	1,40	SF/FF-1200-10	1,30	6,50
SF/FF-500-10	0,60	1,70	SF/FF-1400-3	1,50	6,00
SF/FF-500-16	0,60	1,90	SF/FF-1400-6	1,50	6,80
SF/FF-600-3	0,70	1,90	SF/FF-1400-10	1,50	8,00
SF/FF-600-10	0,70	2,10	SF/FF-1600-3	1,80	7,80
SF/FF-600-16	0,70	2,50	SF/FF-1600-6	1,80	8,50
SF/FF-630-3	0,70	2,00	SF/FF-1600-10	1,80	10,00
SF/FF-630-10	0,70	2,20	SF/FF-1800-3	2,00	9,70
SF/FF-630-16	0,70	2,60	SF/FF-1800-6	2,00	11,00
SF/FF-700-3	0,80	2,50	SF/FF-1800-10	2,00	12,60

Note: these quantities are approximate and are given as a guide only.

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Rotec two component epoxy adhesive cartridge **EPR601**

Rotec two component unfilled epoxy adhesive cartridge EPR601 offers flexibility and confers a good vibration and shock resistance to the bond. It has an open processing time of 75 minutes and can be used and hardened at temperatures between 15 and 40°C.

EPR601 is an epoxy resin (A-component) with an amine hardener (B-component).

Physical properties			
	Unit	A-component	B-component
Viscosity	mPas	High viscous fluid	Low viscous fluid
Density	kg/m3	1220	
Flammability	°C	>150	>140
Mixing proportions	by weight	100	86.5
Mixing proportions	by volume	100	100

Properties at 23°C.

	Unit	Value	Standard
Processing time	minutes	75	
Apparent strength	hours	12	
Full strength (23°C)	hours	72	
Full strength (70°C)	hours	8	
Full strength (100°C)	hours	2	
Push off strength	N/mm2	22	DIN 53283
Pull strength	N/mm2	49	DIN 53455-5-4
Elasticity	%	11	DIN 53455-5-4

Properties at 23°C.

Description of cartridge

EPR601 is packaged in 600ml double cartridge and requires a pneumatic gun for R.I.A.S. processing.
The adhesive is available in boxes containing 12 cartridges of 600ml.

Precautions

We advise that the product be used only at temperatures between +15 and +25°C. Normal health and safety precautions should be followed when handling these products. Ensure good ventilation, wear gloves and safety glasses. For further information please consult the product safety data sheet included in each cartridge.

Storage and preservation.

The shelf life of EPR601 is at least 24 months in its original unopened packaging and at a temperature of+ +15°C. Max. After a period of 12 months some crystallization of the A-component can occur. If this happens it is recommended to heat up the cartridge at 40°C for 16 hours.

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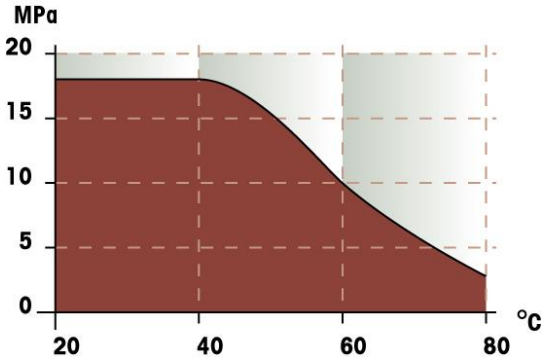
Mechanical properties of bond[1]			
Lap shear strength etched in a sulfochromic bath	ISO 4587-95	Mpa	18
Climbing drum peel strength	ISO 4578-90	kN/m	3.6
Lap shear strength after moist cataplasm at 80°C[2]	ISO 4587-95	Mpa	14
Peel strength after 14 days immersion in water at 80°C	ISO 4578-90	kN/m	2

[1] Conditions of hardening: 8hrs at 80°C + 48 hrs at room temperature
[2] Moist cataplasm: 14 days

Lap shear strength versus temperature



Definitions

OPEN TIME

The maximum time allowed for the application of the adhesive and jointing of parts during which the adhesive surface remains sticky.

ASSEMBLY TIME

The maximum time available, after initially joining the parts, during which the parts can be re positioned. After this time interval has elapsed the parts should no longer be moved, repositioned or subjected to any stress until full hardening of adhesives are complete.

FIXATION TIME

The time interval after which an adhesive joint of a width of 25.4mm and an overlap of 12.7mm is capable of bearing a weight of 1 kg.

Limitations of warranty.

All information in this document is based upon laboratory tests and the current state of our knowledge.

In spite of the greatest care that we have taken, we can accept no liability for the results achieved considering that the design, processing, application, storage methods etc are beyond our control. It is advisable to carry out a test application for the intended application for all above mentioned products.

Neither the manufacturer or his representative and/or distributors accept any liability for advice proffered and/or other services provided in any form, nor for the properties nor performance of these products including any damage, direct or indirect, resulting from the use of these products. Responsibility for the use of these products as well as protection of property and individuals is solely that of the purchaser and/or end user. Supply and properties of the adhesives and associated tools.

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